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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/827,489	04/19/2004	Charles A. Mistretta	960296.00092	3311
26710	7590	11/23/2005		
QUARLES & BRADY LLP 411 E. WISCONSIN AVENUE SUITE 2040 MILWAUKEE, WI 53202-4497			EXAMINER KAO, CHIH CHENG G	
			ART UNIT 2882	PAPER NUMBER

DATE MAILED: 11/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary

Application No.

10/827,489

Applicant(s)

MISTRETTA ET AL.

Examiner

Chih-Cheng Glen Kao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 September 2005.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,4,5,10,11 and 16-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 2 and 16-18 is/are allowed.
- 6) ☒ Claim(s) 4,5,10,11 and 19-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 7/11/05.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The specification is objected to because of the following informalities, which appear to be minor draft errors including drawing inconsistencies and grammatical issues.

In the following format (location of objection; suggestion for correction), the following corrections may obviate their respective objections: (paragraph 22, line 1, "Figs. 5A and 5D"; replacing "and" with - -through- -) and (paragraph 38, line 11, "82 of ??? elements"; deleting "???").

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 19-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 19 recites the limitation "said attenuation data sets" in lines 13-15. Claim 20 recites the limitation "said attenuation data sets" in lines 2-4. Claim 21 recites the limitation "said attenuation data sets" in line 1. The antecedent basis for these limitations is unclear. In line 9 of claim 19, "a first attenuation data set" is recited. In line 11 of claim 19, "additional attenuation data sets" are recited. It is unclear to which limitation "said acquired attenuation data

sets” is referring, the first attenuation data set and the additional attenuation data sets or just the additional attenuation data sets. Therefore, claims 19-21 have been rejected for being indefinite.

The claims have been examined as best understood by the Examiner as follows.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claim 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lanzara et al. (US Patent 5712889) in view of Ooshima (JP 06-125888) and Rasche et al. (US Patent 6865248).

4. Regarding claim 4, Lanzara et al. discloses a method comprising the steps of a) producing a beam of x-rays (col. 2, lines 60-62) with an x-ray source (fig. 1, #12) and directing it into a region of interest (fig. 1, #11) in accordance with a prescribed scan pattern; and b) detecting x-rays in the beam (fig. 1, #26) after they have passed through the region of interest (fig. 1, #11); wherein the x-ray source is mechanically moved around the region of interest when performing the prescribed scan pattern (fig. 3, #12, and col. 3, lines 34-39) and a focal point of the beam of x-rays (fig. 1, focal point on #21) is electronically moved to positions along an axial dimension of the region of interest when performing the prescribed scan pattern (col. 2, lines 60-62), wherein the prescribed scan pattern includes moving the x-ray source around the region of

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interest (fig. 3, #12, and col. 3, lines 34-39) and periodically electronically moving the x-ray source along the axial dimension (col. 2, lines 60-62).

However, Lanzara et al. fails to disclose cone beams or scanning in response to a cardiac trigger signal.

Ooshima teaches cone beams (title and fig. 7, #17). Rasche et al. teaches scanning in response to a cardiac trigger signal (col. 3, lines 46-55).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Lanzara et al. with the cone beams of Ooshima, since one would be motivated to make such a modification for reducing artifacts (abstract, purpose) as implied from Ooshima and saving time.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Lanzara et al. as modified above with the scanning response of Rasche et al., since one would be motivated to make such a modification to achieve higher image quality (col. 2, lines 18-24) as implied from Rasche et al.

5. Regarding claim 5, Lanzara et al. further discloses wherein the x-ray source is moved once around the region of interest during the performance of the prescribed scan pattern (fig. 3, #12, and col. 3, lines 34-39) and the x-ray source is electronically moved a plurality of times along the full extent of the axial dimension (col. 4, lines 43-46).

6. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lanzara et al. in view of Ooshima.

7. Regarding claim 10, Lanzara et al. discloses a system which comprises: a table (col. 3, line 65) for supporting a subject in a cylindrical region of interest disposed along an axis (fig. 1, #11); an x-ray source (fig. 1, #12) for producing a beam of x-rays (col. 2, lines 60-62) directed into the cylindrical region of interest (fig. 1, #11); an array of detectors (fig. 1, #26) disposed around a portion of the cylindrical region of interest (fig. 1, #11) and oriented to detect (fig. 1, #26) x-rays in the beam after they pass through the region of interest (fig. 1, #11); a gantry (fig. 3, #46) for supporting the x-ray source (fig. 3, #12) and array of detectors (fig. 3, #14) and for rotating them (col. 3, lines 34-39) around the cylindrical region of interest (fig. 3, #11) in a plane perpendicular to the axis; means for electronically moving a focal point of the beam of x-rays to positions along the direction of the axis (fig. 1, #19); means for the rotation of the gantry (fig. 3) and the electronic axial movement of the cone beam focal point (fig. 1, #19) in accordance with a prescribed scan pattern; and means for acquiring signals produced by detected x-rays during performance of the prescribed scan pattern and reconstructing an image therefrom (fig. 2), and a collimator (fig. 11, #51) disposed between the array of detectors (fig. 11, #14) and the cylindrical region of interest (fig. 11, #11) and including a plurality of channels directed along said axis (fig. 11, #51), which would necessarily be operable to reduce radiation from sources other than the x-ray source reaching the array of detectors (fig. 11, #14) due to the nature of the collimator.

However, Lanzara et al. fails to seem to specifically disclose cone beams, means for directing, and a two-dimensional array of detectors.

Ooshima teaches cone beams (title and fig. 7, #17), means for directing (fig. 2, #23), and a two-dimensional array of detectors (paragraph 18, "2-dimensional detector 19").

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Lanzara et al. with the cone beams, means for directing, and detector array of Ooshima, since one would be motivated to make such modifications for reducing artifacts (abstract, purpose) as implied from Ooshima and saving time.

8. Regarding claim 11, Lanzara et al. as modified above suggests a device as recited above. Lanzara et al. further discloses a second collimator (fig. 11, #23) disposed between the x-ray source (fig. 1, #21) and the cylindrical region of interest (fig. 11, #11).

However, Lanzara et al. fails to disclose a collimator operable to limit an axial extent of a cone beam of x-rays reaching a region of interest.

Ooshima teaches a collimator operable to limit an axial extent of a cone beam of x-rays reaching a region of interest (fig. 3, #18).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to further incorporate the device Lanzara et al. with the collimator of Ooshima, since one would be motivated to make such a modification to better aim the radiation to the detector (fig. 3) as shown by Ooshima.

9. Claims 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hu et al. (US Patent 5430783) in view of Mistretta et al. (US Patent 5873825).

Hu et al. discloses a method comprising the steps of producing a cone beam of x-rays (abstract, lines 3-4) with an x-ray source (fig. 5, #10) and directing the cone beam of x-rays into

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a region of interest (fig. 5, #42), detecting x-rays (fig. 5, #44) in the cone beam after they have passed through the region of interest (fig. 5, #42), controlling a scan pattern of the x-ray source (fig. 5, #10) by moving the x-ray source around the region of interest (fig. 5, #42) and moving the x-ray source electronically to positions along an axial dimension of the region of interest (fig. 5, #42) to acquire a first attenuation data set with a first spiral scan pattern (fig. 5, #22' to the right), and repeating step c) to acquire additional attenuation data sets with spiral scan patterns that interleave (fig. 5, #22').

However, Hu et al. fails to disclose reconstructing an image by combining all of the data from respective ones of data sets with a part or less than all of the data from other ones of data sets that are temporally adjacent to said respective ones of said data sets to produce a series of images and wherein said data sets are processed before being combined.

Mistretta et al. teaches reconstructing an image by combining all of the data from respective ones of data sets with a part or less than all of the data from other ones of data sets that are temporally adjacent to said respective ones of said data sets (col. 8, lines 9-17) to produce a series of images (col. 9, line 16-17) and wherein said data sets are processed before being combined (col. 8, lines 9-17).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Hu et al. with the reconstructing and processing of Mistretta et al., since one would be motivated to make such a modification to reduce image artifacts (col. 10, lines 1-10) as implied from Mistretta et al.

Allowable Subject Matter

10. Claims 2 and 16-18 contain allowable subject matter. The following is a statement of reasons for the indication of allowable subject matter.

11. Regarding claim 2, prior art fails to disclose or fairly suggest a method including wherein an x-ray source is mechanically moved around a region of interest when performing a prescribed scan pattern and a focal point of a cone beam of x-rays is electronically moved to positions along an axial dimension of the region of interest when performing the prescribed scan pattern, and in which steps a) and b) are repeated to acquire an additional set of image data with a second scan pattern that is interleaved with the prescribed scan pattern, in combination with all the limitations in the claim.

12. Regarding claim 16, prior art fails to disclose or fairly suggest a method including repeating step c) to acquire additional attenuation data sets with spiral scan patterns that interleave, transforming the attenuation data sets acquired in steps c) and d) to a corresponding series of k-space data sets, combining k-space data from temporally adjacent k-space data sets, and reconstructing an image from the combined k-space data, in combination with all the limitations in the claim. Claims 17 and 18 contain allowable subject matter by virtue of their dependency.

Response to Arguments

13. Applicant's arguments with respect to claims 10, 11, and 19-21 have been considered but are moot in view of the new ground(s) of rejection. Applicant's arguments filed 9/9/05 have been fully considered but they are not persuasive.

Regarding claim 4, in response to Applicants' arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. In this case, Lanzara et al. discloses a particular type of scanning. Rasche et al. teaches scanning in response to a cardiac signal. The obvious combination is a particular type of scanning in response to a cardiac signal.

Regarding claim 10, in response to Applicants' argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which Applicant rely (i.e., a collimator having channels disposed in an axial direction) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims.

Regarding claim 19, Applicants argue that Hu et al. fails to disclose spiral scan patterns that interleave. The Examiner disagrees. As pointed out by Applicants, Hu et al. discloses a conventional cone beam CT system, which can perform a spiral scan by rotating the gantry and moving the subject through the gantry. This reads on spiral scan patterns that interleave. After the completion of one spiral about 360°, another spiral is completed about 360°, and so on. These repeated scan patterns create spiral scan patterns that interleave. Therefore, Hu et al. does disclose spiral scan patterns that interleave.

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In response to Applicants' argument that the Examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the Applicants' disclosure, such a reconstruction is proper.

In conclusion, Applicants' arguments are not persuasive, and the claims remain rejected.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (571) 272-2492. The examiner can normally be reached on M - F (9 am to 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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